

REMARKS

In the Final Office Action mailed on April 8, 2005, claims 1-20 have been rejected as anticipated under 35 U.S.C. §102(e) over U.S. Patent No. 6,405,348 to *Fallah-Tehrani* et al. ("*Fallah-Tehrani*"). Because *Fallah-Tehrani* fails to disclose elements required by claims 1-20, this rejection is traversed. It is requested that the Examiner reconsider his rejection and allow the claims. If the below remarks fail to convince the Examiner of the impropriety of the anticipation rejection, they will in the alternative more clearly frame issues for consideration on appeal.

A. *Fallah-Tehrani* Fails to Teach the Claimed Step of Removing Resistors

Independent claim 1 requires steps of, among others, compressing at least a second net connected to a first net by removing all resistors from the distributed RC model of the second net and assigning the second net a sum total capacitance. The first net is a distributed RC model. As discussed in the specification, this can be thought of as creating a "hybrid lumped/distributed model":

... converting the distributed model ... into a hybrid lumped/distributed model. **That is, after the compression steps the power grid nets will remain with capacitors and resistors in a distributed format while secondary nets will have resistors removed and capacitors represented in a lumped format.** The IC model is thereby simplified ... without loss of information required for effective analysis for purposes such as electromigration.

Specification, p. 9, line 27 – p. 10, line 3 (emphasis added). Similar steps are required by remaining independent claims 8, 14 and 17.

Fallah-Tehrani fails to teach the claimed step of removing resistors from a second circuit. The Final Office Action suggests that *Fallah-Tehrani* discloses "(c)ompressing at least a second net connected to the first net by removing resistor or combining (coupling) just capacitors in the distributed RC net of the ... second net..." (underline emphasis added) citing col. 7, lines 5-19 a, col. 7 line 40 to col. 9, line 25 of *Fallah-Tehrani*. It is respectfully submitted that this is a misreading of one or both of the

teachings of *Fallah-Tehrani* and/or the required elements of independent claims 1, 8, 9, 14, 17 and 18.

In these claims, removing resistors from a distributed RC model is not an “alternative” to combining capacitors from the distributed RC model. The Final Office Action suggests that the claims require “removing resistors or combining capacitors” from a second net. The claims, however, require an “and” – not an “or.” Claim 1 as well as all other independent claims require removing all resistors from the distributed RC model of a second net and assigning the second net a total capacitance representing a sum of all capacitors on the second net.

Fallah-Tehrani fails to disclose a step of removing resistors from a distributed RC model of a second net. Instead, *Fallah-Tehrani* teaches using standard RC models (which include resistors) with no disclosure of removing resistors: “Typically, circuit extraction tools model on-chip interconnects as RC (resistor/capacitor) circuit. An RC circuit model ... is shown in FIG. 2.” Col. 6, lines 58-60. It is noted that FIG. 2 includes resistors 250.

Fallah-Tehrani also makes clear that resistors remain in its models when it teaches reading them into its timing tool: “...at step 302, a netlist is read into a static timing analysis tool of the present invention. ... The parasitics (e.g., resistors, capacitors, inductors, and coupling capacitors, etc.) may be read into the static analysis timing tool in DSPF, SPEF or SPICE format.” *Fallah-Tehrani*, col. 7, lines 42-47. Accordingly, *Fallah-Tehrani* not only fails to disclose a step of removing resistors from a distributed RC model of a second net, but teaches away from this required step by requiring resistors to be used in its models.

As a result of the above, *Fallah-Tehrani* fails to teach elements required by all independent claims, and those claims are therefore allowable.

B. *Fallah-Tehrani* Fails to Teach Claimed Steps of Summing Capacitors

It is also submitted that *Fallah-Tehrani* fails to teach the step of summing all capacitors on a second net as is required by all independent claims. Although the

Final Office Action suggests that *Fallah-Tehrani's* “coupling capacitors” (element 240 of FIG. 2) meet this limitation, it is submitted that this is not correct. *Fallah-Tehrani* teaches that: “The coupling between the primary net 210 and aggressor net 220 is also modeled with capacitors 240 between these lines.” Col. 6, lines 66-67. Accordingly, as best understood, *Fallah-Tehrani's* coupling capacitors 240 represent the coupling **between** the two nets – not the sum of the capacitance of only one of the two nets. Because *Fallah-Tehrani* fails to disclose the step of summing all capacitors of a second net connected to a first as is required by all of the independent claims, these claims are allowable over the reference.

C. *Fallah-Tehrani* Fails to Teach a Hybrid Lumped/Distributed Model

Even accepting for the sake of argument only that *Fallah-Tehrani* discloses removing resistors and summing all capacitors from a distributed RC model, *Fallah-Tehrani* would still fail to anticipate independent claims 1, 8, 14 and 17 since these claims all require that a first net be a distributed RC model while a second connected net be compressed through these steps. That is, these claims require using two different types of models for at least two different connected nets. The Specification refers to this as creating a “hybrid lumped/distributed model.” Specification, page 9, line 27 – page 10, line 3.

Fallah-Tehrani fails to teach using a distributed RC model of a first net while using a compressed RC model (resistors removed, capacitors summed) of a connected second net. FIG. 2 of *Fallah-Tehrani*, for instance, shows both the primary net 210 and aggressor net 220 modeled in the same manner. Coupling capacitors 240 represent the “coupling **between** the primary net 210 and aggressor net 220” (col. 6, lines 66-67, emphasis added), not the sum of capacitance of only one of the nets 210 or 220. Further, both nets 210 and 220 are shown with resistors 250. *Fallah-Tehrani* as best understood therefore teaches away from the requirements of these claims when it teaches using a standard RC model for both a primary net 210 and an aggressor net 220. FIG. 2;

col. 4, lines 43 – 45; col. 6, lines 58 – col. 7, line 3. This is still another reason that the anticipation rejection is improper and should be withdrawn.

D. *Fallah-Tehrani* Fails to Teach the Claimed Steps of Electromigration, Gross Current Estimation and Uncompressing

Additional required elements of at least some of the claims are likewise not disclosed. Independent claims 8 and 9, for example, require steps of performing an electromigration analysis and calculating a gross current estimation, respectively. *Fallah-Tehrani* does not disclose these steps. It is noteworthy that the Final Office Action fails to cite any portion of *Fallah-Tehrani* as disclosing these steps.

Claim 12 requires (among other elements) determining whether a calculated gross current estimation for a compressed first net exceeds its current limitations and if so uncompressing the first net by returning the compressed first net to a distributed model. *Fallah-Tehrani* fails to disclose the claimed step of compressing by removing resistors and summing capacitors, much less the claimed step of un-compressing.

Claim 12 further requires performing a gross current estimation after uncompressing the first net on individual segments of the distributed model using the compressed second net. *Fallah-Tehrani* likewise fails to disclose this step.

In rejecting claims 10-12, the Final Office Action simply states, without any citation to *Fallah-Tehrani*, that *Fallah-Tehrani* “...anticipates the features claimed, such as a downstream inverter, gate terminal, etc.” Claim 12, however, does not recite a downstream inverter or a gate terminal (although claims 10 and 11 do). The Final Office Action therefore fails to support its anticipation rejection of claim 12, the rejection is therefore improper and it should be withdrawn.

Claim 19 is allowable over *Fallah-Tehrani* for reasons in addition to its dependence from independent claim 18. Claim 19 further requires the executable instructions to cause the computer to uncompress the first net if a calculated gross current estimation exceeds the current limitations for the first net by returning the compressed first net to a distributed RC model, and subsequently performing a gross current

estimation on individual segments of the uncompressed first net using the compressed secondary net. As discussed above, *Fallah-Tehrani* fails to disclose the required steps of uncompressing and performing gross current estimation on individual segments of the uncompressed first net using the compressed second net.

If the calculated gross current estimation for the first net does not exceed the limitation, claim 19 further requires the program instructions to select one of the secondary nets to perform a gross current estimation on and to calculate a gross current estimation on the secondary net using remaining of the secondary nets.

Fallah-Tehrani fails to disclose or suggest these required elements. Although in rejecting claim 19 the Office Action suggests that *Fallah-Tehrani* "...anticipates the claimed limitation by using the superposition techniques to search for a total response from selected compressed net." No citation to any portion of *Fallah-Tehrani* is provided. Also, it is submitted that even if *Fallah-Tehrani* discloses use of the "superposition techniques" as alleged, their use cannot include the particular steps discussed above including, for instance, uncompressing a compressed first net.

The Examiner appears to admit this, in fact, when he states that the "superposition techniques" are used on a "compressed" first net. If first net is compressed when the technique is applied as the Examiner alleges, this inherently cannot anticipate the claimed requirement that operations be performed on an uncompressed first net. The anticipation rejection of claim 19 is therefore improper and should be withdrawn.

E. Conclusion: The Anticipation Rejection over *Fallah-Tehrani* is Improper


In conclusion, it is submitted that the anticipation rejection over *Fallah-Tehrani* of claims 1-20 is improper and must be withdrawn. *Fallah-Tehrani* fails to disclose at least several elements that are required by the claims. All claims in their current form are allowable. If the Examiner believes that there are additional issues to be

addressed before the claims may be allowed or before this case proceeds to Appeal,
Applicant's undersigned attorney requests the favor of a phone call to discuss the same.

Respectfully submitted,

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